NEXTera ENERGY SEABROOK

April 26, 2016

10 CFR 50.73

Docket No. 50-443
SBK-L-16067

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Seabrook Station
Licensee Event Report (LER) 2016-001-00
Automatic Reactor Trip Due to Turbine Trip

Enclosed is Licensee Event Report (LER) 2016-001-00. This LER reports an event that occurred at Seabrook Station on March 2, 2016. This event is being reported pursuant to the requirements of 10 CFR 50.73(a)(2)(iv)(A).

Should you require further information regarding this matter, please contact me at (603) 773-7512.

Sincerely,

NextEra Energy Seabrook, LLC

Michael Ossing
Licensing Manager

cc: D. Dorman, NRC Region I Administrator
R. Gladney, NRC Project Manager
P. Cataldo, NRC Senior Resident Inspector

IE22
NRR

Enclosure to SBK-L-16067

NRC FORM 366 (11-2015) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2018

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Seabrook	05000 443	1 OF 3

4. TITLE

Automatic Reactor Trip Due to Turbine Trip

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
03	02	2016	2016	001	00	04	26	2016		05000
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*			
1	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☑ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
10. POWER LEVEL	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(C)	☐ 73.77(a)(1)
100	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(D)	☐ 73.77(a)(2)(i)
	☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(vii)	☐ 73.77(a)(2)(ii)
		☐ 50.73(a)(2)(i)(C)	☐ OTHER Specify in Abstract below or in NRC Form 366A	

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT	TELEPHONE NUMBER *(Include Area Code)*
Michael Ossing, Licensing Manager	(603) 773-7512

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	JJ	INVT	A365	Y					

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☑ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☐ NO		07	29	2016

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On March 2, 2016 at 0253 while operating at 100% power, Seabrook Station experienced an automatic reactor trip due to a turbine trip. A failure of inverter ED-I-11 caused a voltage transient in the power supplies for the Turbine Control System (TCS). The TCS is designed with redundant inverters so that the loss of one inverter will not cause a system failure. However, during this event, the inverter failure caused a voltage increase which exceeded the voltage limits of the TCS power supplies causing them to momentarily shut down. Loss of the TCS power supplies initiated an automatic turbine trip signal, which in turn actuated an automatic reactor trip as designed. Other plant equipment functioned as expected and no adverse consequences resulted from this event.

The direct cause of the event was a failure of inverter ED-I-11 which resulted in an overvoltage condition to the turbine control system. At this time, the cause of the failure of the inverter has not been determined. If additional troubleshooting identifies a cause, this LER will be supplemented. Immediate corrective action was implementation of a temporary modification to energize the power panel normally fed by ED-I-11 to eliminate single point vulnerability. Planned corrective actions are to continue troubleshooting and repair of inverter ED-I-11, install overvoltage protection for the TCS cabinets and upgrade the TCS power supplies to higher voltage rated units.

NRC FORM 366A (11-2015) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2018

LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Seabrook Station	05000- 443	2016	- 001	- 00

NARRATIVE

Description of the Event

On March 2, 2016 at 0253 while operating at 100% power, Seabrook Station experienced an automatic reactor trip due to a turbine trip. A failure associated with inverter [JJ, INVT] ED-I-11 caused a voltage transient to a remote control panel that is part of the Turbine Control System (TCS) [JJ]. When this failure occurred, ED-I-11 was one of two power supplies to the turbine control system along with ED-I-12. The TCS is designed with redundant inverters so that the loss of one inverter will not cause a system failure. However, during this event, the inverter failure caused a momentary voltage increase which exceeded the voltage limits of the TCS 28 vdc power supplies causing them to momentarily shut down, resulting in the internal processors in the remote panel rebooting.

The remote processors send their outputs to the main TCS control processors. Upon the loss of output from the remote processors, the 2/3 logic for two separate system parameters was satisfied and an automatic turbine trip signal was initiated. The turbine trip signal initiated a reactor trip.

The operating crew processed through E-0, Reactor Trip or Safety Injection (exited the procedure at step 4 a RNO, (response not obtained)) to ES-0.1, Reactor Trip Response (exited at step 14 a RNO) to OS1000.11, Post Trip to Hot Standby.

Cause of the Event

The direct cause of the event was a failure of inverter ED-I-11 which resulted in an overvoltage condition to the turbine control system. At this time, the cause of the inverter failure has not been determined.

The troubleshooting of the inverter ED-I-11 failure is still in progress. Efforts are being made to replace potentially faulty components and re-install software and perform additional testing on components that were in service at the time of the event. If additional troubleshooting identifies a cause, the root cause evaluation team will be reconvened and this LER will be supplemented.

Analysis of the Event

The Reactor Trip System automatically initiates a reactor trip when any monitored variable or combination of variables approaches pre-established limits. Sufficient redundancy is provided to permit periodic testing while maintaining capability to meet single failure criteria. The Reactor Protection System acts to shut down the reactor, close isolation valves, and initiate operation of the Engineered Safety Features should any or all of these actions be required. The reactor trip on a turbine trip is actuated by two out of three logic from emergency trip header fluid pressure signals or by all closed signals from the turbine steam stop valves. A turbine trip causes a direct reactor trip above P-9. The reactor trip on turbine trip provides additional protection and conservatism beyond that required for the health and safety of the public. This trip is included as part of good engineering practice and prudent design.

A valid actuation of the reactor protection system occurred as the result of a turbine trip. The turbine trip was caused by an overvoltage condition to the 28 vdc power supplies in the turbine control system. The inverter failure caused a momentary voltage increase which exceeded the voltage limits of the TCS 28 vdc power supplies causing them to momentarily shut down, resulting in the remote processors rebooting. Upon the loss of output from the remote processors, the 2/3 logic for two separate system parameters was satisfied and an automatic turbine trip signal was initiated. The plant was at 100% power, above the P-9 set point of 45%. Above P-9 a turbine trip will automatically initiate a reactor trip. An automatic reactor trip signal successfully actuated as designed with the "first out" (indicator of what caused the reactor trip) being "Turbine Trip."

Plant computer data was reviewed to verify that the plant responded as designed during this event. All equipment required to remove decay heat was available prior to the event and functioned properly during the event. The event posed no actual or potential hazard to public health or safety.

NRC FORM 366A
(11-2015)

U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Seabrook Station	05000- 443	2016	- 001	- 00

This event resulted in a valid actuation of the reactor protection system and met the reporting criteria of 10 CFR 50.72(b)(2)(iv)(B). A four hour report was made to the NRC at approximately 0427 on March 2, 2016 (event number 51762). The operators responded to the plant trip in accordance with approved procedures, and safety systems functioned as expected. No adverse consequences resulted from this event and this incident had no adverse impact on the health and safety of the public or the plant and its personnel. This event did not involve a safety system functional failure. No inoperable structures, systems or components contributed to this event.

Corrective Actions

Completed corrective action was the implementation of a temporary modification to energize ED-PP-11A to eliminate single point vulnerability.

Planned corrective actions are to continue troubleshooting and repair of inverter ED-I-11, install overvoltage protection for GE Mark VIe TCS cabinets and upgrade GE Mark VIe TCS power supplies to the higher input voltage phoenix units.

Similar Events

There have been no previous licensee event reports at Seabrook for this issue.

Additional Information

The Energy Industry Identification System (EIIS) codes are included in this LER in the following format: [EIIS system identifier, EIIS component identifier].